

**Geographic Information Systems
Management Office**

USEPA, Region V

1st Year of Operations . . .



December 1989



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF:

To the Reader

Region V and the State agencies have made significant progress toward achieving the shared goals of protection of human health and the environment. However, the sheer intricacy of an environmental agenda that has evolved over the past two decades threatens to slow our progress. Part of the complexity problem concerns the myriad array of environmental data and databases that have been developed to support our environmental programs. Environmental decision-making today requires sophisticated data management systems that are not only fast and accurate, but, most importantly, are capable of integrating large quantities of information.

Geographic Information Systems (GIS) offer the potential to more effectively integrate multi-media data and to display the results in a fashion that should enhance the decision-making process.

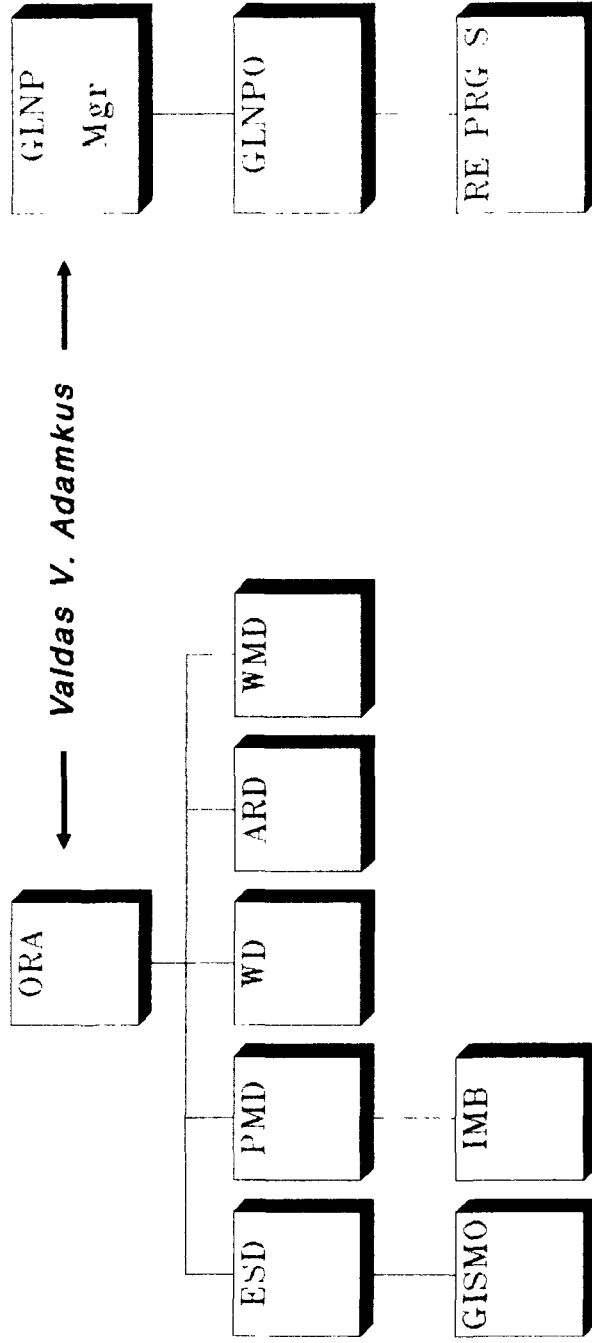
With this brief introduction, I am pleased to release the following report which describes the first year of operation of Region V's Geographic Information Systems Management Office. We hope that the report will serve to document both the progress we have made and the Regional capabilities in this emerging technology.

A handwritten signature in cursive script that reads "W. Sanders".

William H. Sanders III, Director
Environmental Sciences Division

Geographic Information Systems Management Office

Region V GIS Organization



Key GIS Functions

Geographic Information Systems Management Office

USEPA, Region V

1st Year of Operations . . .

GIS Goal for Region V

Enhance Environmental Decision-Making
Through Spatial Analyses

GIS Objectives

- Support Risk Reduction and Pollution Prevention by Mapping Environmental Status, Needs and Progress
- Apply State-of-the-Art Data Integration and Analysis Technologies
- Enhance the Federal-State Partnership Through Data Sharing and Stewardship
- Support Program Operations by Providing Quality GIS Products and Analyses

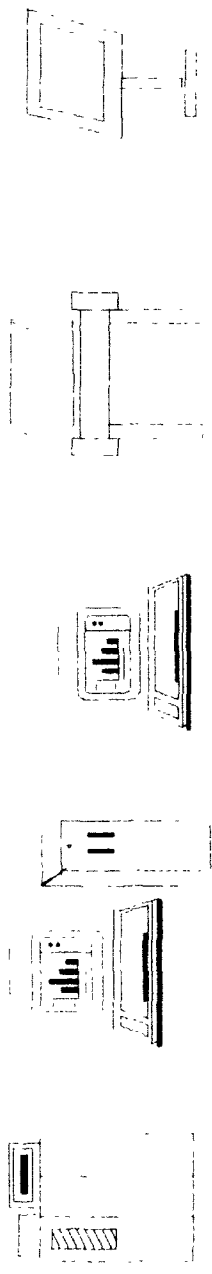


The Region V GIS Team

OFFICE	GIS MANAGER	PRIME ADMIN	GIS COORDINATOR	GIS ANALYST	ARC/INFO TRAINING
GISMO	N. Kohl			B. Bolka J. Schneider D. McWha	Advanced Advanced Advanced
PLANNING		T. Knightly	D. Werbie		
WATER			J. Anagnost W. Melville	J. Anagnost	Advanced Basic
AIR			P. Blakley	P. Blakley	Basic
WASTE			W. Francis		
GLNPO			P. Prancekevicius	B. Manne	Advanced

GIS HARDWARE IN USE AT REGION V

CPU WORKSTATION TERMINALS PLOTTERS/ PRINTERS DIGITIZERS



OFFICE

Prime 2755	Tek 4325	1-Tek 4107	Tek 4693	CalComp 91XX
		2-Tek 4207	CalComp 58XX	
	Tek 4325	1-Tek 4225	CalComp 1044	CalComp 9148
		1-Tek 4207		

GISMO

GLNPO

WATER

AIR

WASTE

PLANNING

● 1-2 years

Geographic Information Systems Management Office

USEPA, Region V

1st Year of Operations . . .

Milestones Achieved

- Organization Approved - Sep 88
- Personnel Trained - Jan 89
- Hardware and Software Operational - Mar 89
- Initial GIS Products Developed - Apr 89
- Office Relocation Completed - Oct 89



Geographic Information Systems Management Office

USEPA, Region V

1st Year of Operations . . .

Milestones Planned

- **Initiate an MOU with GLNPO and PMD** - Dec 89
- **Initiate Outreach to States & Reg V Program Staffs** - Jan 90
- **Regional GIS Strategy** - Mar 90
- **Complete Workstation Pilot** - Jul 90
- **Complete Several GIS Projects** - Jul 90



Geographic Information Systems Management Office

USEPA, Region V

1st Year of Operations . . .

Projects with GIS Components

TITLE	LEAD	FOCUS	COMPL
Ashtabula Harbor	GISMO	Superfund NPL	Jul '90
TRI Data Analyses	GISMO	Toxic Releases	Feb '90
Bottomland Hardwoods Phase I	Water	Wetland Impacts	Jul '90
Trenton Channel Mass Balance	GLNPO	Toxic Impacts	Jun '90
Bottomland Hardwoods Phase II	Water	Wetland Impacts	TBA
Green Bay Mass Bal	GLNPO	Toxic Impacts	TBA
RCRA Site Priority System	GISMO	RCRA Site Mgmt	TBA
Trans Boundary Study	ARD	Air Toxics	TBA



Geographic Information Systems
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USEPA, Region V

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GIS Applications
for
Air Programs



**Note: Some Examples That Follow Were Originally
Intended for Display in a 48" x 36" Format**

GIS APPLICATIONS FOR AIR PROGRAMS

BACKGROUND

As part of the initial work in supporting program efforts and demonstrating the utility of GIS technology, the GIS Management Office developed selected map products reflecting the release of dichloromethane to the air media. The effort demonstrated a potential application for Air Program use and served as a training vehicle for the Regional staff in downloading and displaying TRI information. The TRI data analysis is discussed in more detail under the Section addressing GIS Applications for Toxic Substances Control.

DATA COVERAGES

Dichloromethane Releases by County - Stack Emissions
Dichloromethane Releases by County - Fugitive Emissions
Political Boundaries

PRODUCT

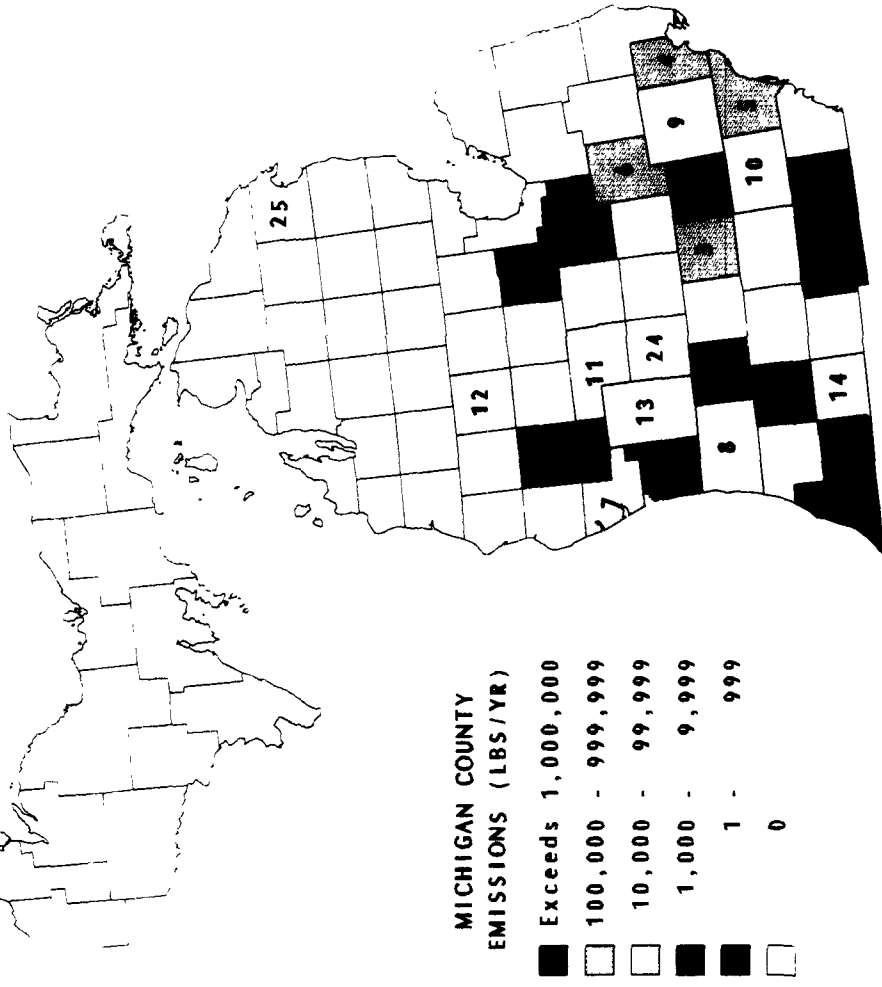
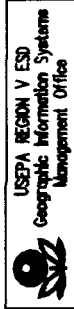
GIS map displaying area information.

Dichloromethane Stack Air Emissions by County

DICHLOROMETHANE (methylene chloride) is classified as a probable human carcinogen, whether inhaled or ingested. Counties that are not colored and unlabeled had no reported emissions. Uncolored but labeled counties had reported uses of dichloromethane but emissions were reported as zero.

COUNTY	LBS/YEAR
1 KALAMAZOO	374000
2 MIDLAND	156963
3 INGHAM	388000
4 MACOMB	233174
5 WAYNE	189500
6 GENESEE	185557
7 MUSKEGON	59872
8 ALLEGAN	36000
9 OAKLAND	25691
10 WASHTENAW	23200
11 MONTCALM	22231
12 OSCEOLA	20342
13 KENT	18834
14 ST. JOSEPH	13400
15 OTTAWA	8300
16 LIVINGSTON	6200
17 BERRIEN	6000
18 HILLSDALE	2000
19 NEWAYGO	750
20 LENAWEE	750
21 SAGINAW	500
22 BARRY	250
23 CASS	4
24 IONIA	0
25 ALPENA	0

PROJECTION - Albers Conic Equal Area.
SOURCES (1) Political boundaries from USGS digital line graphs, scale - 1:2,000,000. (2) Chemical data from the Toxic Release Inventory (TRI) database for calendar year 1987, the most current available as of August 1989.



BJB / JS KAUCIP

Indiana PM-10 Monitoring Network



INDIANA ACTIVE PM-10 SITES (PM2.5)

COUNTY	AIR ID	WIND	WIND
1	18000004	18	484800
2	18010002	18	481800
3	18020001	18	483000
4	18030003	18	481800
5	18040004	18	481800
6	18050005	18	481800
7	18060006	18	481800
8	18070007	18	481800
9	18080008	18	481800
10	18090009	18	481800
11	18100010	18	481800
12	18110011	18	481800
13	18120012	18	481800
14	18130013	18	481800
15	18140014	18	481800
16	18150015	18	481800
17	18160016	18	481800
18	18170017	18	481800
19	18180018	18	481800
20	18190019	18	481800
21	18200020	18	481800
22	18210021	18	481800
23	18220022	18	481800
24	18230023	18	481800
25	18240024	18	481800
26	18250025	18	481800
27	18260026	18	481800
28	18270027	18	481800
29	18280028	18	481800
30	18290029	18	481800
31	18300030	18	481800
32	18310031	18	481800
33	18320032	18	481800
34	18330033	18	481800
35	18340034	18	481800
36	18350035	18	481800
37	18360036	18	481800
38	18370037	18	481800
39	18380038	18	481800
40	18390039	18	481800
41	18400040	18	481800
42	18410041	18	481800
43	18420042	18	481800
44	18430043	18	481800
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47	18460046	18	481800
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50	18490049	18	481800
51	18500050	18	481800
52	18510051	18	481800
53	18520052	18	481800
54	18530053	18	481800
55	18540054	18	481800
56	18550055	18	481800
57	18560056	18	481800
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63	18620062	18	481800
64	18630063	18	481800
65	18640064	18	481800
66	18650065	18	481800
67	18660066	18	481800
68	18670067	18	481800
69	18680068	18	481800
70	18690069	18	481800
71	18700070	18	481800
72	18710071	18	481800
73	18720072	18	481800
74	18730073	18	481800
75	18740074	18	481800
76	18750075	18	481800
77	18760076	18	481800
78	18770077	18	481800
79	18780078	18	481800
80	18790079	18	481800
81	18800080	18	481800
82	18810081	18	481800
83	18820082	18	481800
84	18830083	18	481800
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91	18900090	18	481800
92	18910091	18	481800
93	18920092	18	481800
94	18930093	18	481800
95	18940094	18	481800
96	18950095	18	481800
97	18960096	18	481800
98	18970097	18	481800
99	18980098	18	481800
100	18990099	18	481800

INDIANA MAJOR PM-10 SOURCES

FACILITY	WIND	WIND
1	18	487800
2	18	481800
3	18	481800
4	18	481800
5	18	481800
6	18	481800
7	18	481800
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97	18	481800
98	18	481800
99	18	481800
100	18	481800

DATA SOURCE: AIRS MONITORING - 1998 Active Sites
 PROJECT: AIRS MONITORING SYSTEMS
 GOVERNMENT: INDIANAPOLIS, IN



NW Indiana Area

Geographic Information Systems
Management Office
USEPA, Region V

1st Year of Operations . . .

GIS Applications
for
Great Lakes Programs



Note: Some Examples That Follow Were Originally
Intended for Display in a 48" x 96" Format

GIS APPLICATIONS FOR GREAT LAKES PROGRAMS

BACKGROUND

As part of the initial work in supporting program efforts and demonstrating the utility of GIS technology, the GIS Management Office developed selected map products reflecting the location of the Great Lakes Air Deposition Network sites. These products will be used in more extensive future work that will require spatial analysis of deposition information reported at each station.

DATA COVERAGES

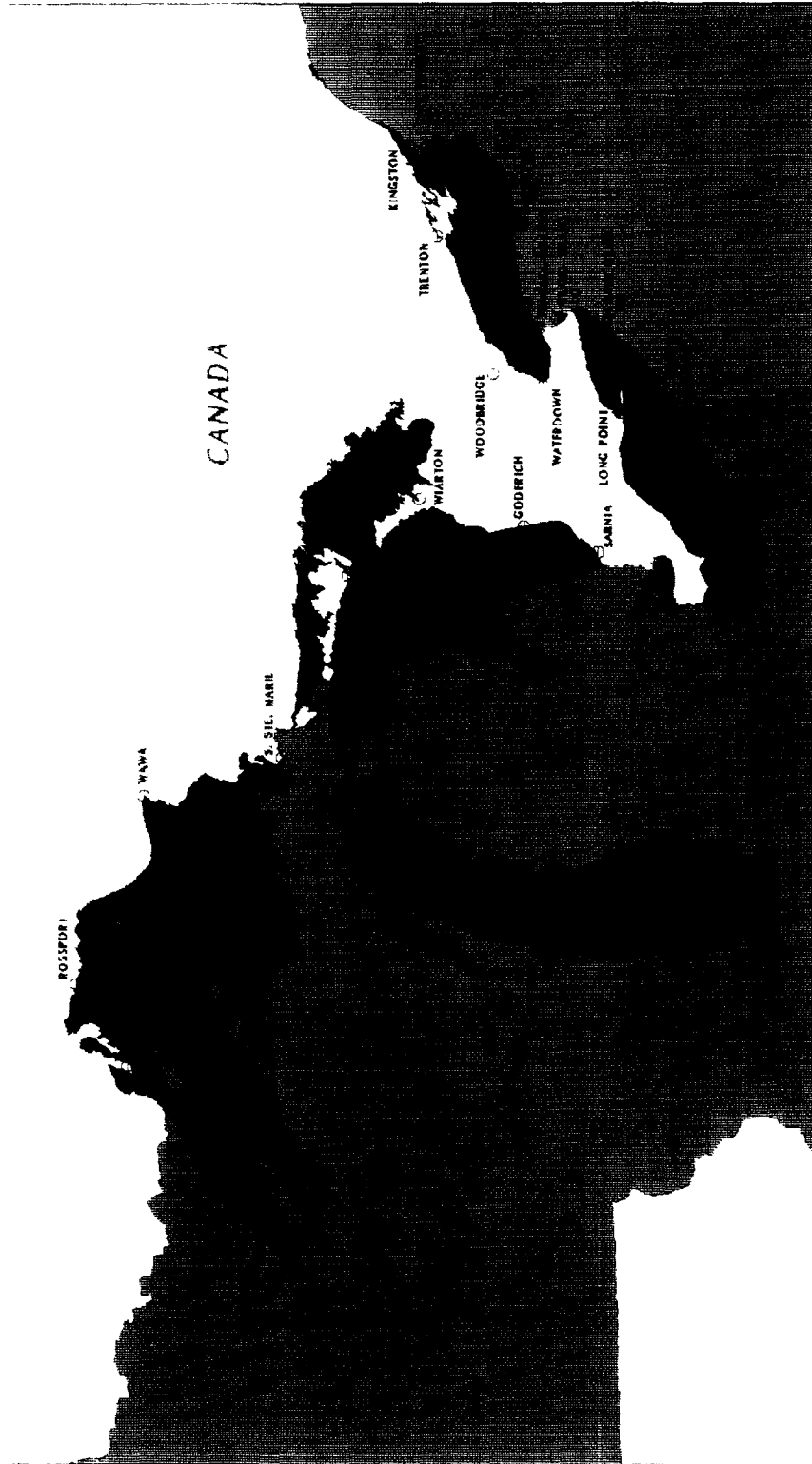
Hydrology
GLAD Network - US

Political Boundaries
GLAD Network - Canadian

PRODUCTS

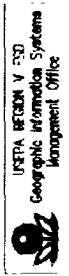
GIS maps integrating point information.

Great Lakes Atmospheric Deposition Network



SITE LOCATION SYMBOLS
 (U.S. GLAD Network
 (Canadian GLNP Network

DATA SOURCES
 Site Locations:
 Great Lakes National Program Office
 Political Boundaries:
 USGS 1:2M Digital Line Graphs
 PROJECTION
 Albers Conic Equal-Area



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1st Year of Operations . . .

GIS Applications
for
Toxic Substances Control



Note: Some Examples That Follow Were Originally
Intended for Display in a 48" x 36" Format

ANALYSIS OF TOXIC RELEASE INVENTORY (TRI) DATA

BACKGROUND

In November 1986, Congress passed the Emergency Planning and Community Right Know Act as an amendment to the Superfund reauthorization. The act mandated that manufacturers, processors and users of toxic chemicals report yearly on the emission and transfer of more than 300 toxic chemicals. The reports indicate whether the toxic chemicals were released to (1) air by stack emissions, (2) air by fugitive emissions, (3) water, or (4) land; (5) injected underground, (6) transferred to a publicly owned treatment facility; or (7) transferred off site. The data, initially submitted by the releasers in mid-1988, was entered into EPA's IBM 3090 mainframe in North Carolina, and was made available to the Regions, States and the public in a variety of formats in March 1989.

Shortly after publication of the Toxic Release Inventory System (TRIS) database, interest was expressed by a number of program offices in Region V for GIS maps that depicted the distribution of toxic chemical releases. Initial GIS products and a report were prepared in August 1989. Follow on products are in the planning and development stage.

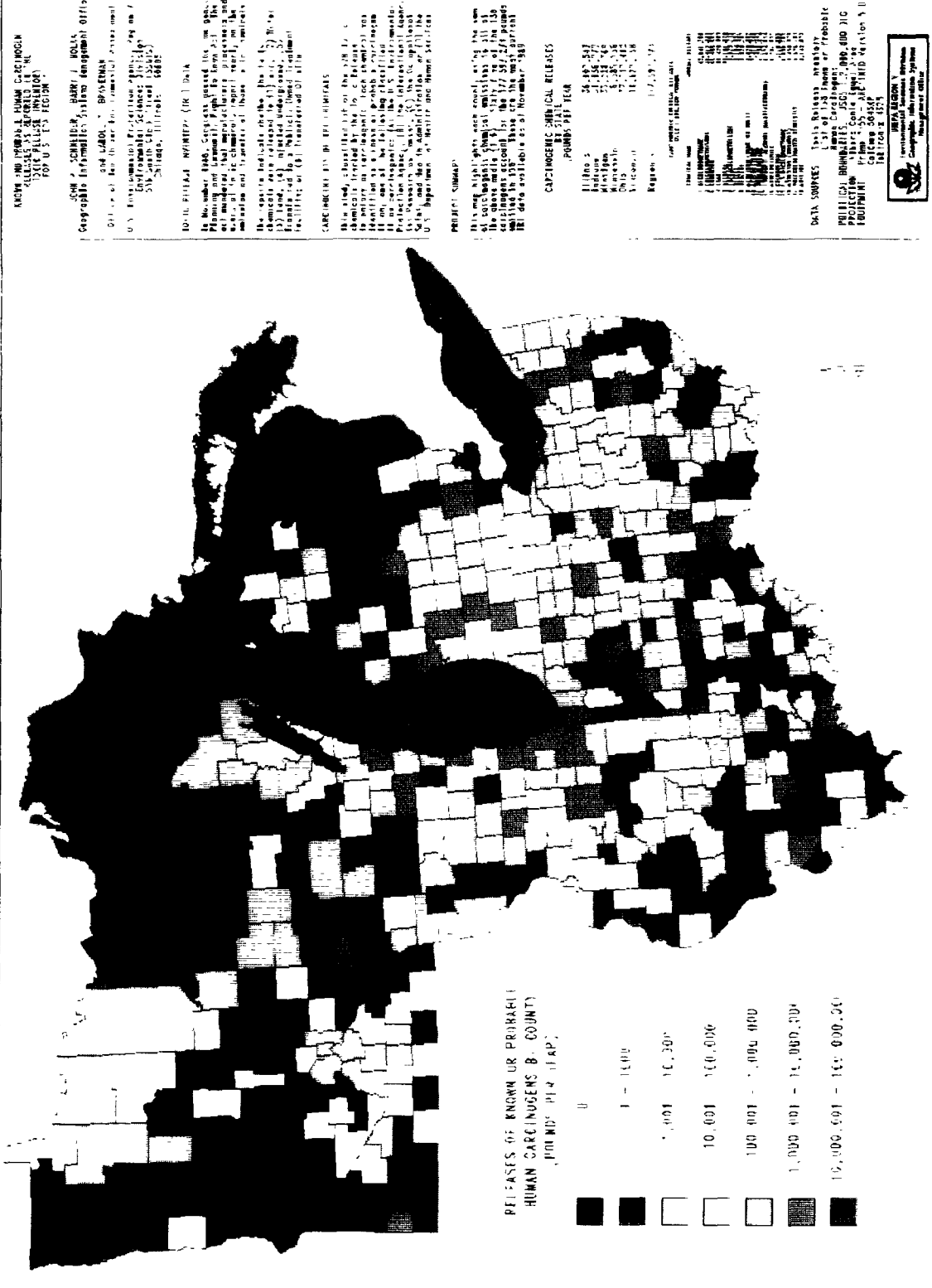
DATA COVERAGES

Toxic Releases by Media	Carcinogenic Releases
Section 304(l) Stream Boundaries	Hydrography
National Priority List Sites	Political Boundaries

PRODUCTS

Dichloromethane Stack Emissions	by	County -
Michigan		
Dichloromethane Fugitive Emissions	by	County -
Michigan		
Dichloromethane Water Releases	by	County -
Michigan		
Dichloromethane Transfers to POTWs	by	County -
Michigan		
Dichloromethane Land Releases	by	County -
Michigan		
Chromium Releases to Ground Water	by	County -
Michigan		

Toxic Release Inventory - Carcinogenic Chemicals



KNOW AND SUSPECTED HUMAN CARCINOGENS
STATE RELEASE INVENTORY
FOR U.S. 153 REGION

JOHN J. SCHNEIDER, BARRY J. MOLLA
Geographic Information Systems Management Office
504 MABO, SPRINGFIELD
U.S. Environmental Protection Agency, Region 7
Environmental Sciences Division
515 North Lincoln Street
Chicago, Illinois 60605

10-11. FINAL INVENTORY (R1) DATA
In November 1980, Chemicals listed in the 153 region inventory were analyzed for carcinogenicity and all carcinogenic chemicals were included in this inventory. The carcinogenicity classification and chemical name were transferred from the 153 inventory to this inventory. The specific chemical name, the 153 ID chemical name, and the 153 ID chemical name were transferred to this inventory. The carcinogenicity classification was transferred to this inventory. The carcinogenicity classification was transferred to this inventory.

CARCINOGENIC CHEMICALS
This study, identified 107 of the 153 carcinogenic chemicals listed by the 153 inventory. In order to verify the carcinogenicity classification, 107 of the 153 carcinogenic chemicals were analyzed. The carcinogenicity classification was transferred to this inventory. The carcinogenicity classification was transferred to this inventory.

PROJECT SUMMARY
This map highlights areas receiving the sum of carcinogenic chemical releases of 100,000 pounds per year. The areas receiving the sum of carcinogenic releases are shaded in gray. This map is available as of November 1980.

CARCINOGENIC CHEMICAL RELEASES (POUNDS PER YEAR)

Illinois	26,492,577
Indiana	21,156,777
Michigan	21,258,746
Ohio	21,258,746
Wisconsin	11,129,373
Region	107,297,771

DATA SOURCES
This project inventory was compiled from the following sources:
- Environmental Protection Agency, Region 7
- Environmental Sciences Division
- Illinois Department of Health
- Michigan Department of Health
- Ohio Department of Health
- Wisconsin Department of Health

REGIONAL OFFICE
John J. Schneider, Barry J. Molla
Geographic Information Systems Management Office
504 MABO, SPRINGFIELD
U.S. Environmental Protection Agency, Region 7
Environmental Sciences Division
515 North Lincoln Street
Chicago, Illinois 60605



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Management Office
USEPA, Region V

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GIS Applications
for
Surface Water Programs



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GIS APPLICATIONS FOR WATER PROGRAMS

BACKGROUND

As part of the initial work in supporting program efforts and demonstrating the utility of GIS technology, the GIS Management Office developed selected map products reflecting the location of the STORET Stations in Michigan. These products will be used in more extensive future work that will require spatial analysis of STORET water quality data reported at each station. The effort also served as a training vehicle for the Regional staff in downloading and displaying STORET information. The TRI data and 304(l) coverage is discussed in more detail under the Section addressing GIS Applications for Toxic Substances Control.

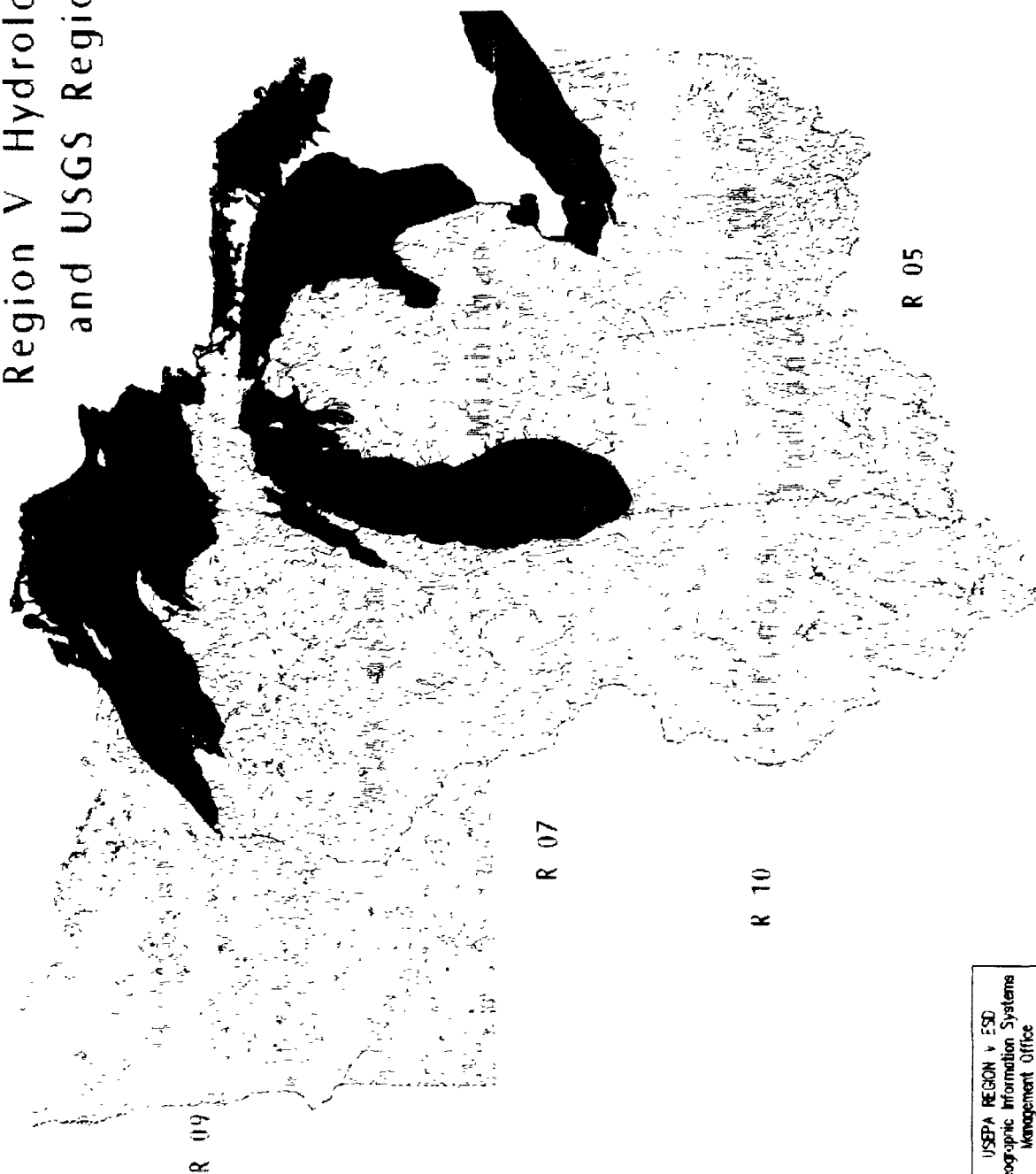
DATA COVERAGES

Hydrography
STORET Stations - Michigan (Active 1989)
Political Boundaries

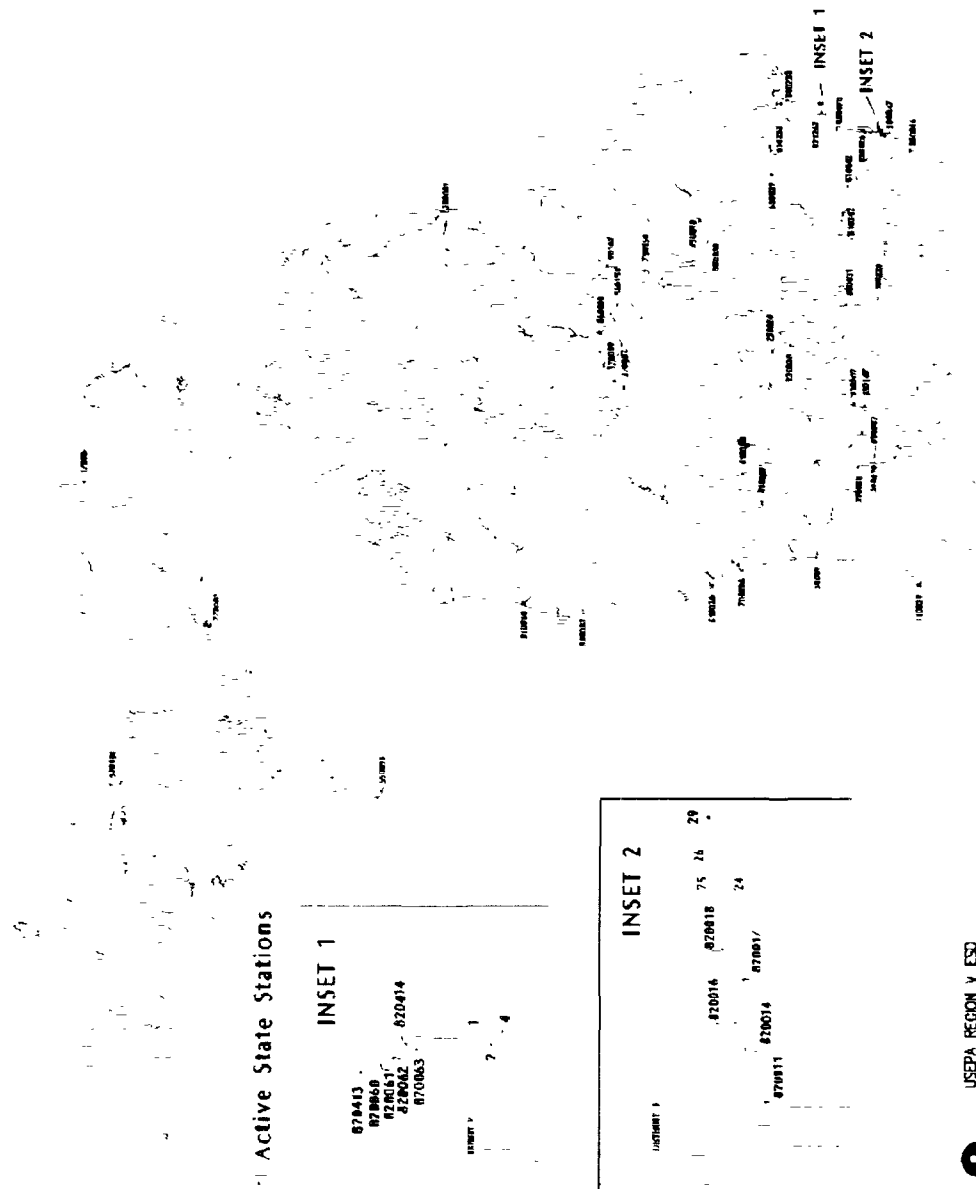
PRODUCT

GIS map displaying point information.

Region V Hydrology and USGS Regions



Michigan STORET Stations



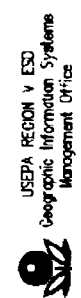
Active State Stations

INSET 1

879413
879469
879651
879822
879814
879863

INSET 2

879811
879816
879818
879826
879829
879834
879837



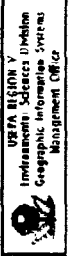
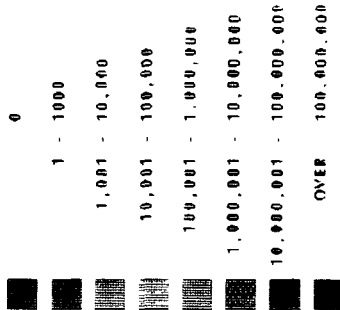
BASINS WITH 304L LISTED STREAMS AND TRI WATER RELEASES



BASINS WITH 304L LISTED STREAMS AND TRI WATER RELEASES OVER 10 MILLION LBS YR IN ROCK ISLAND COUNTY, ILLINOIS

BASIN WITH 304L LISTED STREAM

ANNUAL TRI RELEASES TO SURFACE WATERS (POUNDS)



PROJECTION: Albers Conic Equal-Area
 DATA SOURCES: Toxic Release Inventory
 (TRI); Short List
 WSCV 1 7M DFC

Geographic Information Systems
Management Office

USEPA, Region V

1st Year of Operations . . .

GIS Applications
for
Waste Management Programs



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ANALYSIS OF MULTI-MEDIA DATA FOR ASHTABULA COUNTY

BACKGROUND

The lower Ashtabula River, harbor, and ground water have been contaminated with heavy metals, poly-chlorinated biphenyls, chlorinated organic compounds, and oxygen consuming materials. One of the primary sources of contamination is the Fields Brook National Priority List Superfund site. A number of State and Federal agencies are involved in the clean-up activities. The Ashtabula GIS project will support these efforts through spatial analysis of the area, resources, pollutants and human factors.

A GIS plan of study was completed in June 1989 to guide the multi-media effort. The effort will result in maps to assist in the assessment of human health risks, display toxic hot spots, show Toxic Release Inventory data, and map other sources of pollutants to the river and harbor. Efforts will be made to coordinate the work with development of studies now in progress for the Phase II cleanup.

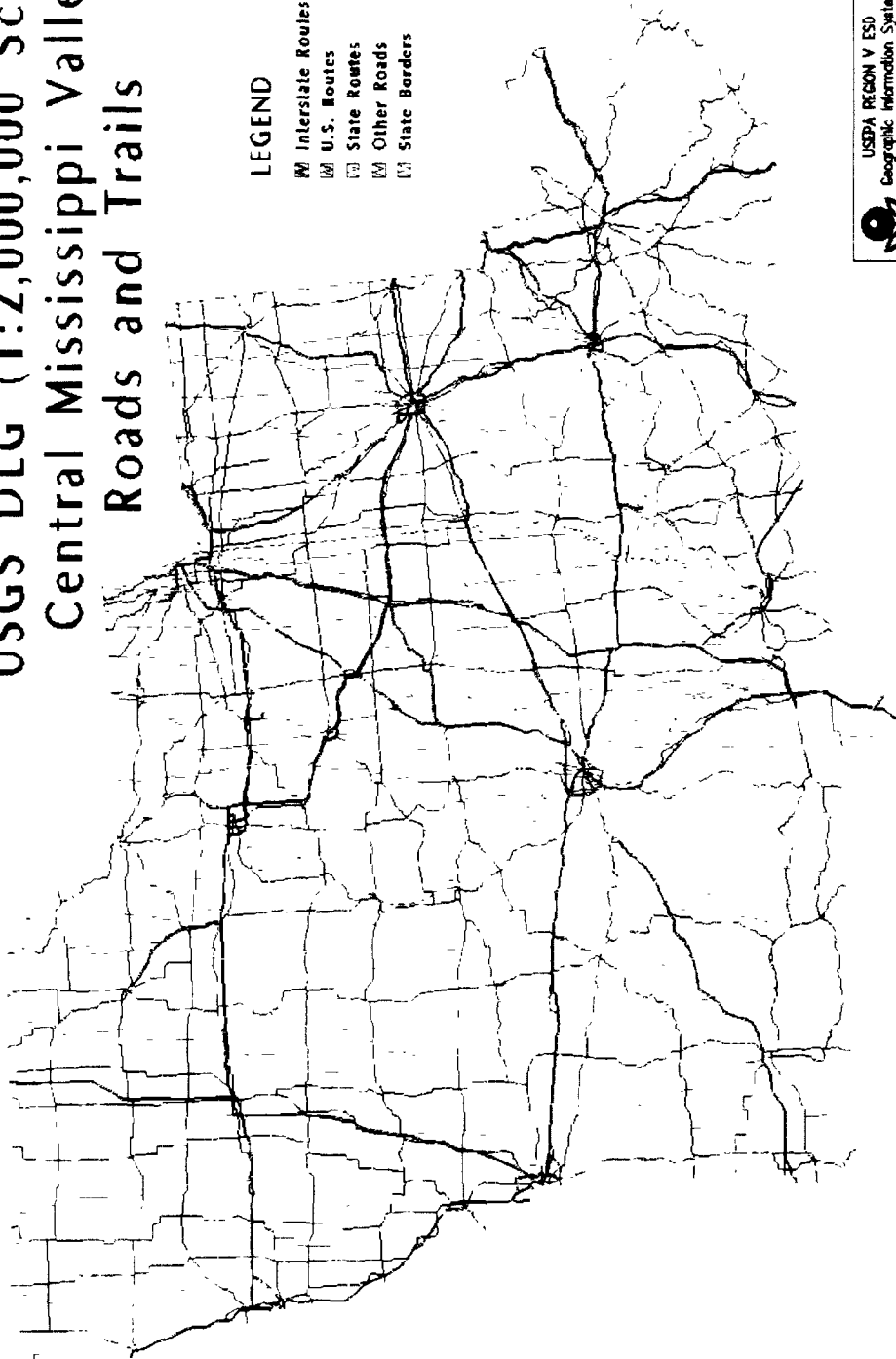
DATA COVERAGES

Toxic Releases by Media	Carcinogenic Releases
Section 304(1) Stream Boundaries	Hydrography
National Priority List Boundaries	Political Boundaries
Census Tract Data	Drinking Water
Sources	
Land Use/ Land Cover	Hospitals
Schools/Preschools/Daycare	Transportation
Fish Tissue Sample Data	Zip Code Polygons
Air Monitoring Sites	Glacial Geology
Sediment Sample Locations	Soils
Water Monitoring Sites	Wetlands

PRODUCTS

- Maps of monitoring data collected at the NPL site.
- Maps of Toxic Release Inventory data.
- A Map of RCRA Sites within the study area.
- Demographic data mapped at appropriate scales.
- Drinking water source maps and ground water quality.
- Isopleths of specific air pollutant profiles.
- Maps of NPDES dischargers and pollutant discharge data.
- Sediment contamination maps.
- Integrated data coverages for risk assessment purposes.

USGS DLG (1:2,000,000 Scale) Central Mississippi Valley Roads and Trails

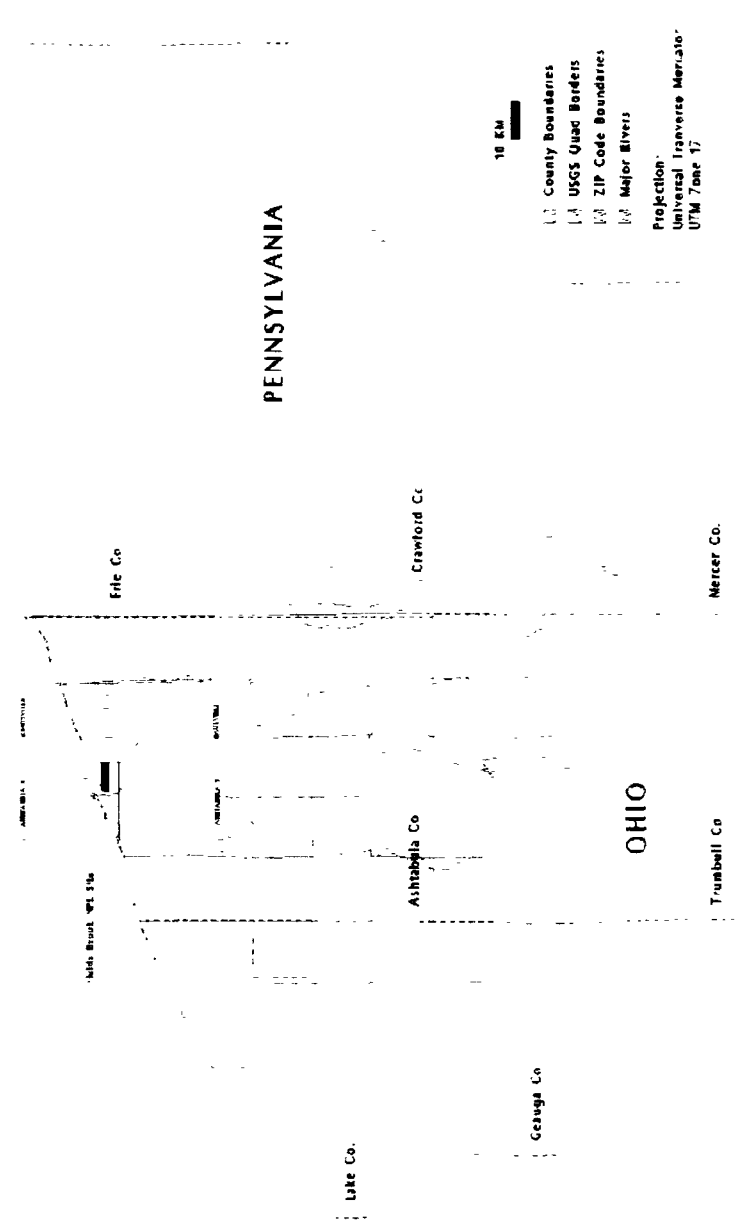


LEGEND

- ▬ Interstate Routes
- ▬ U.S. Routes
- - - State Routes
- ▬ Other Roads
- - - State Borders

Ashtabula, Ohio and Environs

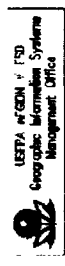
Lake Erie



10 KM

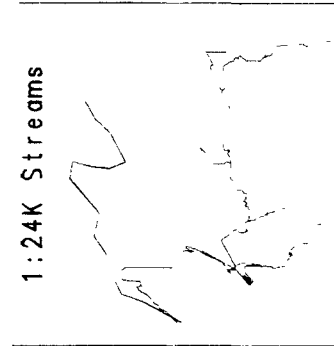
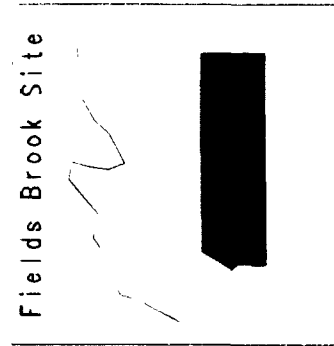
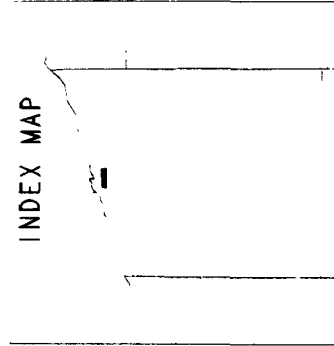
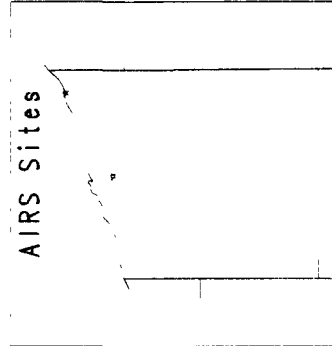
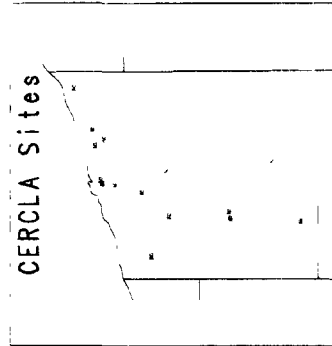
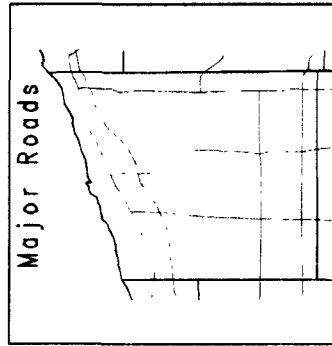
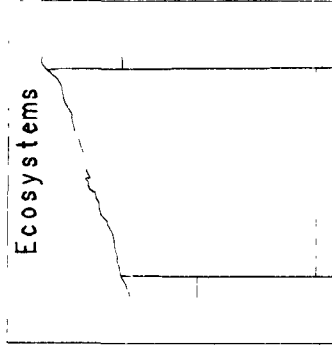
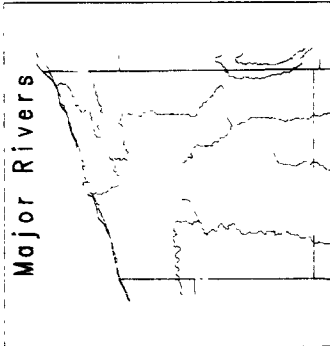
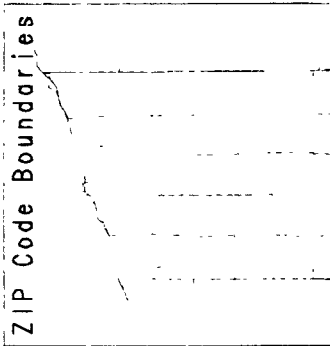
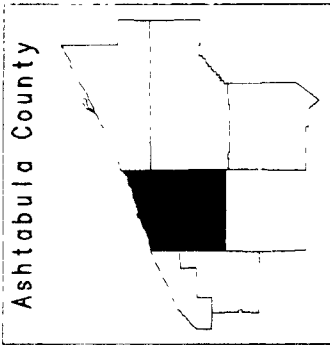
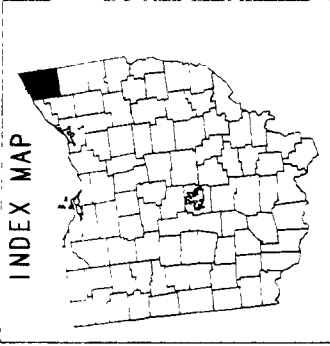
- County Boundaries
- USGS Quad Borders
- ZIP Code Boundaries
- Major Rivers

Projection:
Universal Transverse Mercator
UTM Zone 17



U.S. Environmental Protection Agency
U.S. Forest Service
Geographic Information Systems
Management Office

ASHTABULA STUDY COVERAGES



Geographic Information Systems
Management Office

USEPA, Region V

1st Year of Operations . . .

GIS Applications
for
Wetland Protection Programs



Note: Some Examples That Follow Were Originally
Intended for Display in a 48" x 36" Format

BOTTOMLAND HARDWOODS GIS PROJECT

BACKGROUND

Bottomland Hardwood (BLH) Forests are wetland resources which are marked for priority attention by the U.S. Environmental Protection Agency, Office of Wetlands Protection. Bottomland hardwoods have also become the subject of other Federal Agency management programs. Recognizing that southern BLH forests are part of the global ecosystem of forested wetlands that are undergoing heavy acreage losses, the Water Division staff in cooperation with the Environmental Monitoring Systems Laboratory - Las Vegas developed a plan for completing a multi-phased wetlands study incorporating GIS and remote sensing technology.

The project will be performed in a limited geographic area within the Big Muddy and Cache River basins in Southern Illinois. Phase I will provide the spatial extent, change detection and Landsat classification/GIS efficiencies. Based on the results of Phase I, Phase II will provide a functional and value assessment of the BLH forest. Phases III and IV envision a validation process and extension of the process to other areas within the Region.

DATA COVERAGES

Hydrography	Political Boundaries
Transportation	Landuse/Landcover
Hypsography	Soil Classification
BLH Boundaries - Spring Scene	
BLH Boundaries - Summer Scene	

PRODUCTS

GIS Database consisting of multiple coverages.
High altitude photo interpretation data.
Ground truth study and results.
Wetland change detection efficiencies using Landsat/GIS.
Reports on each Phase of the study.



WETLAND MAP
FOR THE GORHAM
USGS QUAD